

# 广州化工

GUANGZHOU CHEMICAL INDUSTRY



扫码关注

第13期  
2022年7月  
(上半月)  
第50卷

- 《中国学术期刊综合评价数据库》统计源刊
- 《中国期刊全文数据库》全文收录期刊
- 《中国核心期刊(遴选)数据库》全文收录期刊

全网首推

产业链资源全公开  
快人一步进入生意圈

活动日期 7月1日-8月31日



水处理

多彩化工 · 专业视角



扫码进入小程序

ISSN 1001-9677



主办：  
广州化工研究设计院  
广州市化工行业协会

# 广州化工

## GUANGZHOU HUAGONG

《中国学术期刊综合评价数据库》统计源刊  
《中国核心期刊(遴选)数据库》全文收录期刊  
《中国期刊全文数据库》全文收录期刊  
高、中级化工职称资格评审认定期刊  
广东省特色科技期刊  
全国石油和化工期刊百强榜学术期刊 50 强

1973 年创刊(半月刊)

第 50 卷第 13 期

2022 年 7 月(上半月)

主 管:广州化工集团有限公司  
主 办:广州化工研究设计院  
广州市化工行业协会

编辑出版:《广州化工》编辑部

主 编:吴文莉

副 主 编:林珺颖

编 辑:何启宏,曹 欣

地 址:广州市黄埔区科学大道 111 号科学信息  
大厦主楼西座 609-610 号

邮 码:510670

电 话:020-31801512

13560218977(林副主编)

官方网站:<http://www.gzhghjb.cn>

<http://gzha.cbpt.cnki.net>

邮 箱:gzhghjb@vip.126.com

gzhgqks@163.com

印 刷:广州市德佳彩色印刷有限公司

发行范围:国内外公开发行

国外发行:中国出版对外贸易总公司  
(北京 782 信箱)

国际标准刊号:ISSN1001-9677

国内统一刊号:CN44-1228/TQ

广告经营许可证:穗工商广字 4401004002668 号

出版物经营许可证:新出发粤刊总批字第 226 号

国内定价:28.00 元/期 全年 672.00 元(共 24 期)

### 第九届编委会成员名单(按姓氏笔画排序)

马小明 方岩雄 尹国强 卢 江 叶代勇  
叶家灿 吕满庚 刘自力 闫 利 麦堪成  
麦裕良 李伟华 李攻科 李雪辉 杨丽庭  
杨育农 吴文莉 余 林 陈旭东 周添国  
郑 成 赵建红 赵建青 徐志达 章明秋  
彭 峰 童叶翔 曾松峰 楼宏铭 蔡卫权  
廖 兵 谭志良

# 目 次

## 化工信息

广化交易纯碱市场月度监测报告(2022 年 6 月)…………… (1)

## 专论与综述

膜控微丸制剂的研究进展……………

…………… 刘毓婷,程永凤,张彬彬,孟永男,曹殿洁(8)

钴基锂离子电池负极材料研究进展……………

…………… 谭雪晴,应少明,黄志强(11)

茂金属烯烃聚合催化剂研究进展……………

… 胡 程,张连红,文 婕,张 辉,贺 敏,刘智慧,罗克胜(16)

聚离子液体复合材料性能及制备方法的研究进展……………

…………… 田 晴(20)

铝电解槽废阴极炭块资源化研究进展……………

…………… 蒋勇军,赵文新,陈东玖,周 豪,宿新泰,杨 超,赵晨曦(23)

铁皮石斛的抗氧化、保湿功效研究和应用现状……………

…………… 陈漪汶,文 霞,黄健聪,张淑瑶,郑雅莉,谢小保(27)

碳纤维增强 PVC 树脂基复合材料的生产工艺及发展前景……………

…………… 陆蕾蕾,宋功品(32)

埃洛石纳米管在树脂中的研究进展……………

…………… 肖凯元,张印民,张永锋,汪晓文(34)

过渡金属硫化物电催化分解水研究进展……………

…………… 武兰兰,路 璐,李志伟,李敬德(37)

油基钻井液乳化剂稳定作用机理研究…………… 王苏南(40)

气相色谱技术在化工分析行业中的应用研究…………… 丛新宇(43)

## 科学实验

UV/PMS/HQ<sub>2</sub>体系对他汀类药物的去除作用及机制研究……………

…………… 赵孟雷,袁守军(46)

新型杀虫剂氟啶脲的合成工艺改进…………… 邵 倩,

秦 岭,李 强,王 纯,付达权,刘殿卿,罗 艺,何东贤(51)

溶剂萃取法从电解锰净化渣浸出液中回收锰钴镍的研究……………

…………… 黎桂昌,吴元花,叶有明,谢雪珍,文美娜(55)

提高玻璃纤维/聚碳酸酯复合材料流动性能的方法研究……………

…………… 肖 一,甘梦雨,魏 铮,林炜煌,杨 勇(59)

生物质碳材料制备及其去除水体中对硝基苯酚的性能……………

…………… 杨金辉,吾日也提·阿吉,张小毅(62)

K<sup>+</sup>/Sr<sup>2+</sup>共掺蓝色钙钛矿量子点的制备与发光性质……………

…………… 刘德权,彭文昊,李庆娜,周文理(66)

氧化亚锡的制备工艺研究 .....	莫稀玉,孙松,杨育兵(70)
红冬蛇菰的化学成分研究 .....	陈孝礼,江文婧,吴继春,杜江(73)
超级电容器碳材料的制备及性能测试 .....	王心如,刘嘉怡,丁晗,杜锦涛,赵会玲(76)
盐酸改性凹凸棒石对废水中六价铬的吸附研究 .....	斯少杰(81)
一种席夫碱缓蚀剂对碳钢的缓蚀作用与温度的关系 .....	苏铁军,黄健(84)
碳酸二甲酯和乙醇酯交换法制备碳酸二乙酯的工艺研究 .....	王真贝,钱贇(86)
氨基改性磁性纳米 $MnFe_2O_4$ 对水中苯酚的吸附性能研究 .....	肖榕(90)
1,2-二(三甲基硅氧基)环己烯的合成 .....	邱金倬,朱旭,刘祥洪(93)
$GaNbO_4$ 晶体掺杂生长及氧空位缺陷调控的研究 .....	谷锡猛(96)

## 分析测试

HPLC 测定豆制品中丙酸钙结果的不确定度评价 .....	刘强欣,林婷,闻佳钰,王志超,钟寒辉,董叶菁(100)
苍术-玄参药对 HPLC 指纹图谱的建立及指标性成分研究 .....	刘利利,刘颖新,彭攸灵,毛群芳,邱艳明,彭丽英(104)
高效液相色谱法测定注射用左亚叶酸钠有关物质的研究 .....	姜海兵,邱文(108)
HPLC 法同时测定不同产地番红花中 4 种化合物的含量 .....	尚严严,李东林(112)
吹扫捕集-气相色谱质谱法测定土壤中己醛的含量 .....	湛恒乐,杨学灵,郑国华,许青,魏嘉良(116)
离子色谱法测地下水中 4 种阴离子含量的不确定度评定 .....	张亮,宋盈,刘杨,陈旭华(118)
钙指示剂修饰电极同时测定嘌呤和嘧啶 .....	刘小娴(122)
不同自动粘度仪在油品分析中的应用研究 .....	高珍琪,杨操,李成伟(125)
食品包装用原纸中铅和砷的能力验证及分析方法 .....	周慧,马义虔(128)

## 环境保护

絮凝剂强化 A/O 生物膜法处理煤气化废水的研究 .....	谈龙方,袁守军(131)
呼和浩特市哈素海水体中多环芳烃污染特征及生态风险评价 .....	鲁玥,黄卫丽,包呈敏,苏日娜,王牧仁(135)
电解锰渣库周边土壤重金属污染调查与防控策略探讨 .....	罗宝利,薛希仕,杨晓红(139)
十三五期间广州市黄埔区空气环境质量浅析 .....	李伟彬(142)
电石制乙炔废水除磷工艺研究 .....	郁亚磊,武奇,卢亚伟(144)
城市绿地重金属污染与防治 .....	李硕,盛恭勇,李明明(147)

## 化工机械

应用聚丙烯腈纤维增强金属管线长效防腐材料抗开裂性能实验研究 .....	孙世安,邱贞慧,马军,阮少军,郝敬团,费逸伟(149)
基于卷积神经网络的多种金属腐蚀等级研究 .....	胡欢欢,俞文昌,王梓洋,李海涛(152)
塑性变形与调质处理耦合作用对 40Cr 钢钎焊接头疲劳性能的影响研究 .....	习小慧,陈柏潼,刘永乐,彭晓柏,王金亮(156)
旧标制造的 L485M 钢管用于高压燃气管道的可行性分析 .....	曾浩,张勇(159)

## 生产技术

异戊二烯生产工艺流程的模拟与优化 .....	顾国威,朱静,吴文涛(163)
粉煤热解分馏系统主要工艺和控制 .....	常娟,李慧杰,樊花,童泽明(167)

- 低压边远零散井伴生气产量预测计算研究 ..... 李琳(170)  
提高阳极炉直收率的研究 ..... 虞晓航,马国跃,谢长振(173)

## 教学园地

- 多元化教学模式的实验综述——以碳酸氢钠片剂的制备为例 ..... 查元,陈雪晴,朱金燕(176)  
“紫外-可见分光光度法测定药材的多糖含量”开放性实验的设计 .....  
..... 李燕,严万莉,曾紫微,肖竦,何彬(179)  
薄层色谱实验改进 ..... 周小强,蔡秀琴,黄栋,田战友,安航(182)  
海洋环境化学综合实验课程改革与实践 ..... 皮永蕊,唐永政,段晨阳,孙淑娟(185)  
《功能材料》课程项目化教学与改革探索 ..... 程菲(190)  
积极教学法在“煤化学”课程设计中的探索与实践 ..... 马玉苗,周肖(193)  
“基于问题的学习”的有机化学习题课的教学模式探索 ..... 盖聪昊,赵庆杰,金永生(196)  
工程材料实验教学中学生创新能力培养探索 ..... 梁银,陈磊,龚静芳(199)  
以《化学工艺学》课程改革为例的化工类金课建设 ..... 范娟,代方方,郭睿(202)  
现代仪器分析课程思政教学改革探索 .....  
..... 弓爱君,张玮玮,邱丽娜,范慧俐,刘杰民,李建强,厉文辉,吴传东(206)  
CDIO 视角下行业特色高校一流工科人才培养模式探索 .....  
..... 刘昆明,李娟华,李立清,李金辉,刘晋彪,王瑞祥(209)  
新工科背景下化工过程模拟实验的教学探究 ..... 李静,王克良,陈定梅,李松,缪应菊,叶昆(212)  
基于学生思维能力培养的有机化学实验线上线下混合式教学与实践初探 .....  
..... 李静静,熊帮云,聂宝华,邓前军,陈东初(215)  
基于本科生创新研究需求的扫描电镜实验教学模式探索研究 ..... 覃丽禄,郝龙龙,马妞(217)  
新工科建设背景下《仪器分析》课程改革研究 ..... 王蓉,谭文渊,韩建军,吕永军,张丽萍(220)  
基于项目驱动的硕博联动科研创新能力培养 ..... 杨冬燕,周新华,周红军(223)  
《环境工程综合实验》需求导向的教学改革 .....  
..... 王章鸿,彭继友,杨成,刘杰刚,邱露,顾闰尧,刘静(226)  
基于大学生自主学习能力培养的《分析化学》教学策略 ..... 潘自红(229)  
有机化学课程与思政元素融合的教学设计 ..... 董振华,袁金伟,杨亮茹,刘捷(231)  
构建分析化学一流课程,助力公共基础本科教学 ..... 史全全,许辉,平贵臣,李金梅,丁洪晶,巩霞(234)  
浅谈新工科背景下新能源材料与器件专业建设思路 ..... 吴小帅,史转转,杨晓刚,郭春显(237)  
《锅炉原理》中课程思政切入点与融入方式的探索 ..... 葛亚,王文豪,何清,陈佰满(239)  
《化学与社会》通识课教学探索与实践 ..... 张雁红,王海燕(242)  
WWHW 思考模型对比醇和酚中羟基活动性的教学实践 .....  
..... 张禹,赵文霞,张彩芳,刘利利,梁永锋,马文霞(245)  
化工技术经济课程线上线下混合教学模式探索 ..... 刘军辉,宋亚坤,勾明雷,郭旭明,李欣(247)  
基于蓝墨云班课的混合式教学模式在《石油化工工艺》课程的应用 ..... 王会,杨帅强(250)

## 安全与管理

- 化学实验室安全管理的思考与建议 ..... 龙生清,阮代钺(253)  
“三全育人”视角下化学实验教学中心的建设与管理 ..... 刘洋,姜丹,徐立新,汤海峰(256)

# CONTENTS

Research Progress on Coated Pellets .....	LIU Yu-ting, CHENG Yong-feng, ZHANG Bin-bin, MENG Yong-nan, CAO Dian-jie (8)
Research Progress on Cobalt-based Anode Materials for Lithium-ion Batteries .....	TAN Xue-qing, YING Shao-ming, HUANG Zhi-qiang (11)
Research Progress on Metallocene Olefin Polymerization Catalysts .....	HU Cheng, ZHANG Lian-hong, WEN Jie, ZHANG Hui, HE Min, LIU Zhi-hui, LUO Ke-sheng (16)
Research Progress on Properties and Preparation Methods of Poly(Ionic Liquid)s Composites ...	TIAN Qing (20)
Research Progress on Resource Utilization of Waste Cathode Carbon Block from Aluminum Reduction Cell .....	JIANG Yong-jun, ZHAO Wen-xin, CHEN Dong-jiu, ZHOU Hao, SU Xin-tai, YANG Chao, ZHAO Chen-xi (23)
Research Progress on Antioxidant and Moisturizing Effect of Dendrobium Candidum .....	CHEN Yi-wen, WEN Xia, HUANG Jian-cong, ZHANG Shu-yao, ZHENG Ya-li, XIE Xiao-bao (27)
Production Technology and Development Prospect of Carbon Fiber Reinforced PVC Resin Matrix Composites .....	LU Lei-lei, SONG Gong-pin (32)
Research Progress on Halloysite Nanotubes in Resins .....	XIAO Kai-yuan, ZHANG Yin-min, ZHANG Yong-feng, WANG Xiao-wen (34)
Research Progress on Electrocatalytic Water Splitting of Transition Metal Sulfides .....	WU Lan-lan, LU Lu, LI Zhi-wei, LI Jing-de (37)
Study on Stabilization Mechanism of Oil-Based Drilling Fluid Emulsifier .....	WANG Su-nan (40)
Application of Gas Chromatography in Chemical Analysis Industry .....	CONG Xin-yu (43)
Removal of Statins in UV/PMS/H <sub>2</sub> O <sub>2</sub> System and Its Mechanism .....	ZHAO Meng-lei, YUAN Shou-jun (46)
Improvement of Synthesis Process of Novel Insecticide Fluoxazuron .....	SHAO Qian, QIN Ling, LI Qiang, WANG Chun, FU Da-quan, LIU Dian-qing, LUO Yi, HE Dong-xian (51)
Recovery of Manganese, Cobalt and Nickel from Leaching Solution of Electrolytic Manganese Purification Residue by Solvent Extraction .....	LI Gui-chang, WU Yuan-hua, YE You-ming, XIE Xue-zhen, WEN Meina (55)
Study on Method of Improving Flow Performance of GF/PC .....	XIAO Yi, GAN Meng-yu, WEI Zheng, LIN Wei-huang, YANG Yong (59)
Preparation of Biomass Carbon Material and Its Performance in Removing P-nitrophenol from Water .....	YANG Jin-hui, Aji-Wuriyeti, ZHANG Xiao-yi (62)
Preparation and Luminescence Properties of K <sup>+</sup> /Sr <sup>2+</sup> Co-doped Blue Perovskite Quantum Dots .....	LIU De-quan, PENG Wen-hao, LI Qing-na, ZHOU Wen-li (66)
Study on Preparation of Stannous Oxide and Its Industrial Application .....	MO Xi-yu, SUN Song, YANG Yu-bing (70)
Study on Chemical Constituents of <i>Balanophora harlandii</i> Hook. f .....	CHEN Xiao-li, JIANG Wen-jing, WU Ji-chun, DU Jiang (73)
Preparation and Electrochemical Performance Testing of Carbon Materials for Supercapacitors .....	WANG Xin-ru, LIU Jia-yi, DING Han, DU Jin-tao, ZHAO Hui-ling (76)
Study on Adsorption of Cr <sup>6+</sup> in Wastewater Using HCl Modified Ayyapulgitite .....	SI Shao-jie (81)
A Relationship between Corrosion Inhibition of A Schiff Base Inhibitor on Carbon Steel and Temperature .....	SU Tie-jun, HUANG Jian (84)
Process Study on Preparation of Diethyl Carbonate by Transesterification of Dimethyl Carbonate and Ethanol .....	WANG Zhen-bei, QIAN Yun (86)
Adsorption of Phenol by Amino-modified MnFe <sub>2</sub> O <sub>4</sub> Magnetic Nanoparticles .....	XIAO Rong (90)
Synthesis of 1,2-Bis(trimethylsiloxy) Cyclohexene .....	QIU Jin-zhuo, ZHU Xu, LIU Xiang-hong (93)
Study on Doping Growth of GaNbO <sub>4</sub> Crystal and Regulation of Oxygen Vacancy Defects .....	GU Xi-meng (96)
Evaluation of Uncertainty in HPLC Determination of Calcium Propionate in Soy Products .....	LIU Qiang-xin, LIN Ting, WEN Jia-yu, WANG Zhi-chao, ZHONG Han-hui, DONG Ye-qing (100)
Establishment of HPLC Fingerprint and Study on Index Components in <i>Atractylodes lancea</i> - <i>Scrophularia ningpoensis</i> Drug Pair .....	LIU Li-li, LIU Ying-xin, PENG You-ling, MAO Qun-fang, QIU Yan-ming, PENG Li-ying (104)
Determination of Related Substances in Sodium Levofloxacin for Injection by HPLC .....	JIANG Hai-bing, QIU Wen (108)

Simultaneous Determination of Four Compounds in <i>Crocus sativus</i> L. from Various Places by HPLC .....	SHANG Yan-yan, LI Dong-lin(112)
Determination of Hexanal in Soil by purge-trap and Gas Chromatography-mass Spectrometry .....	ZHAN Heng-le, YANG Xue-ling, ZHENG Guo-hua, XU Qing, WEI Jia-liang(116)
Evaluation of Uncertainty in Determination of Four Anions in Groundwater by Ion Chromatography .....	ZHANG Liang, SONG Ying, LIU Yang, CHEN Xu-hua(118)
Simultaneous Determination of Purine and Pyrimidine DNA Bases by Eriochrome Blue Black R Film .....	LIU Xiao-xian(122)
Application of Different Automatic Viscometer Instrument in Oil Analysis .....	GAO Zhen-qi, YANG Cao, LI Cheng-wei(125)
Proficiency Testing of Lead and Arsenic in Food Packaging Base Paper & Analytic Methods .....	ZHOU Hui, MA Yi-qian(128)
Experimental Study on Treatment of Coal Gasification Wastewater by Flocculant Enhanced A/O Biofilm Process .....	TAN Long-fang, YUAN Shou-jun(131)
Pollution Characteristics and Ecological Risk Assessment of PAHs in Lake Hasuhai, Hohhot .....	LU Yue, HUANG Wei-li, BAO Cheng-min, SU Ri-na, WANG Mu-ren(135)
Investigation and Discussion of Prevention and Control Strategy of Heavy Metal Pollution in Soil around Electrolytic Manganese Slag Reservoir .....	LUO Bao-li, XUE Xi-shi, YANG Xiao-hong(139)
Analysis of Air Environmental Quality in Huangpu District, Guangzhou City during the 13th Five-Year Plan .....	LI Wei-bin(142)
Study on Phosphorus Removal Process of Acetylene Wastewater from Calcium Carbide Production .....	YU Ya-lei, WU Qi, LU Ya-wei(144)
Pollution and Prevention of Heavy Metals in Urban Green Space .....	LI Shuo, SHENG Gong-yong, LI Ming-ming(147)
Experimental Study on Cracking Resistance of Polyacrylonitrile Fiber Reinforced Long Term Anticorrosive Material for Metal Pipeline .....	SUN Shi-an, QIU Zhen-hui, MA Jun, RUAN Shao-jun, HAO Jing-tuan, FEI Yi-wei(149)
Study on Corrosion Grades of Various Metals Based on Convolutional Neural Network .....	HU Huan-huan, YU Wen-chang, WANG Zi-yang, LI Hai-tao(152)
Study on Fatigue Properties of 40Cr Steel Welded Joint under Plastic Deformation and Quenching & Tempering .....	XI Xiao-hui, CHEN Bo-tong, LIU Yong-le, PENG Xiao-bo, WANG Jin-liang(156)
Feasibility Analysis of L485M Steel Pipe Manufactured by Old Standard for High Pressure Gas Pipeline .....	ZENG Hao, ZHANG Yong(159)
Simulation and Optimization of Isoprene Production Process .....	GU Guo-wei, ZHU Jing, WU Wen-tao(163)
Main Process and Control of Pulverized Coal Pyrolysis Fractionation System .....	CHANG Juan, LI Hui-jie, FAN Hua, TONG Ze-ming(167)
Study on Prediction and Calculation of Associated Gas Production in Low-voltage and Remote Zero-dispersion Wells .....	LI Lin(170)
Study on Improving Direct Yield of Anode Furnace .....	YU Xiao-hang, MA Guo-yue, XIE Chang-zhen(173)
An Experimental Summary of Diversified Teaching Modes ——Taking Preparation of Sodium Bicarbonate Tablets as An Example .....	ZHA Yuan, CHEN Xue-qing, ZHU Jin-yan(176)
Design of An Opening Experiment of “Determination of Polysaccharide Content in Traditional Chinese Medicinal Materials by UV-Vis Spectrophotometry” .....	LI Yan, YAN Wan-li, ZENG Zi-wei, XIAO Song, HE Bin(179)
Improvement of Thin Layer Chromatography Experiment .....	ZHOU Xiao-qiang, CAI Xiu-qin, HUANG Dong, TIAN Zhan-you, AN Hang(182)
Teaching Reform and Practice on Marine Environmental Chemistry Comprehensive Experiment .....	PI Yong-rui, TANG Yong-zheng, DUAN Chen-yang, SUN Shu-juan(185)
Programmatic Teaching and Reform Exploration on Functional Materials Curriculum .....	CHENG Fei(190)
Exploration and Practice on Positive Teaching Method in Coal Chemistry Course Design .....	MA Yu-miao, ZHOU Xiao(193)
Exploration on Teaching Mode of “Problem-based Learning” in An Organic Chemistry Tutorial Class .....	GAI Cong-hao, ZHAO Qing-jie, JIN Yong-sheng(196)
Exploration on Innovation Ability Training of Students in Engineering Material Experiment Teaching .....	LIANG Yin, CHEN Lei, GONG Jing-fang(199)
Reform on Chemical Technology Course in Course Construction of Chemical Engineering and Technology .....	FAN Juan, DAI Fang-fang, GUO Rui(202)
Exploration on Ideological and Political Teaching Reform in Modern Instrumental Analysis Course .....	GONG Ai-jun, ZHANG Wei-wei, QIU Li-na, FAN Hui-li, LIU Jie-min, LI Jian-qiang, LI Wen-hui, WU Chuan-dong(206)

Exploration on Cultivation Mode of First-class Engineering Talents in Industry Characteristic Universities on View of CDIO ..... *LIU Kun-ming, Li Juan-hua, Li Li-qing, Li Jin-hui, LIU Jin-biao, WANG Rui-xiang* (209)

Teaching Exploration on Chemical Process Simulation Experiment under the Background of Emerging Engineering Education ..... *LI Jing, WANG Ke-liang, CHEN Ding-mei, Li Song, MIAO Ying-ju, YE Kun* (212)

Teaching Innovation and Exploration Via Online and Offline Blended-teaching Model for Cultivation of Students' Thinking Ability in Organic Chemistry Experiments Lecture ..... *LI Jing-jing, XIONG Bang-yun, NIE Bao-hua, DENG Qian-jun, CHEN Dong-chu* (215)

Exploration and Research on Experimental Teaching Mode of Scanning Electron Microscope Based on Innovative Research Needs of Undergraduates ... *QIN Li-lu, HAO Long-long, MA Niu* (217)

Teaching Reform on Instrumental Analysis Course under Guidance of Emerging Engineering Education ..... *WANG Rong, TAN Wen-yuan, HAN Jian-jun, LV Yong-jun, ZHANG Li-ping* (220)

Cultivation of Research and Innovation Ability Based on Project-driven Linkage between Graduate and Undergraduate Students ... *YANG Dong-yan, ZHOU Xin-hua, ZHOU Hong-jun* (223)

Teaching Reform on Environmental Engineering Comprehensive Experiment Based on Industry Demand ..... *WANG Zhang-hong, PENG Ji-you, YANG Cheng, LIU Jie-gang, QIU Lu, GU Run-yao, LIU Jing* (226)

Teaching Strategy of Analytical Chemistry Based on Cultivation of College Students Autonomous Learning Ability ..... *PAN Zi-hong* (229)

Case Design of Integration between Organic Chemistry and Ideology Course ..... *DONG Zhen-hua, YUAN Jin-wei, YANG Liang-ru, LIU Jie* (231)

Building A First-class Course of Analytical Chemistry for Improving Public Basic Undergraduate Teaching ..... *SHI Quan-quan, XU Hui, PING Gui-cheng, LI jin-mei, DING Hong-jing, GOMG Xia* (234)

Ideas for Professional Education Program of New Energy Material and Device to New Engineering Background ..... *WU Xiao-shuai, SHI Zhuan-zhuan, YANG Xiao-gang, GUO Chun-xian* (237)

Exploration on Breakthrough Point and Integration Approach of Ideological and Political Education in Boiler Principle ..... *GE Ya, WANG Wen-hao, HE Qing, CHEN Bai-man* (239)

Teaching Exploration and Practice on Chemistry and Society General Course ..... *ZHANG Yan-hong, WANG Hai-yan* (242)

Teaching Practice on Comparing Hydroxy Activity in Alcohol and Phenol by WWHW Thinking Model ... *ZHANG Yu, ZHAO Wen-xia, ZHANG Cai-fang, LIU Li-li, LIANG Yong-feng, MA Wen-xia* (245)

On-line and Off-line Teaching Practice on Economics of Chemical Technology Course ..... *LIU Jun-hui, SONG Ya-kun, GOU Ming-lei, GUO Xu-ming, LI Xin* (247)

Application of Blended Teaching Mode Based on Lanmoyun Class in Petrochemical Technology Course ..... *WANG Hui, YANG Shuai-qiang* (250)

Thoughts and Suggestions on Safety Management of Chemical Laboratory ..... *LONG Sheng-qing, RUAN Dai-tan* (253)

Construction and Management of Chemical Experimental Teaching Center from Perspective of "Three-Education" system ..... *LIU Yang, JIANG Dan, XU Li-xin, TANG Hai-feng* (256)

## GUANGZHOU CHEMICAL INDUSTRY

Open Publishing

Established in 1973 (Semimonthly)

Vol. 50 No. 13

Jul. 2022

### Managed by:

Guangzhou Chemical Industrial Group Co., Ltd.

### Sponsored by:

Guangzhou Research & Design Institute of Chemical Industry  
Guangzhou Society of Chemistry and Chemical Engineering

### Edited by:

Editorial Office of "GUANGZHOU CHEMICAL INDUSTRY"

**Chief Editor:** WU Wen-li

**Vice Chief Editor:** LIN Jun-ying

**Editor:** HE Qi-hong, CAO Xin

**Address:** No. 609-610, West Block, Main Building,  
Science Information Building, 111 Huangpu  
District Science Avenue, Guangzhou, P. R.  
China

**Postcode:** 510670

**Tel:** 020-31801512

13560218977 (Associate Editor Lin)

**Official website:** <http://www.gzhgbjb.cn>

<http://gzha.cbpt.cnki.net>

**E-mail:** [gzhgbjb@vip.126.com](mailto:gzhgbjb@vip.126.com)

[gzhgqks@163.com](mailto:gzhgqks@163.com)

### Printed by:

Guangzhou Dejia Color Printing Co., Ltd.

### Overseas Distributed by:

China National Publishing Industry Trading Corporation

**Journal Code:** ISSN 1001-9677  
CN 44-1228/TQ

**Advertising Business License No.:** 4401004002668